power to the bilge pumps. The main components are thus simply, the battery, the watertight chamber, and the bilge pumps.

[c4] The proposed control/propulsion system is significantly different from Cicoff etc. (6,601,333). His game decoy, for one does not submerge and while a jet propulsion system is proposed, it uses functionally equivalent RC servos or solenoids to operate a three-way directional valve. This is similar to Fleischman where instead of hydraulic servos being used to activate dive planes and rudder's, Cicoff etc proposes mechanical/electrical operation of a directional valve. Whereas in the system proposed herein there are no moving directional valves, connecting rods, solenoid switches or servos or equivalent electro/mechanical devices. Jet nozzles are fixed and powered by individual bilge pumps. Furthermore this game decoy is not proposed as a submarine having the ability to submerge as in the proposed embodiment.

[c5] A method according to claim 1 which can be applied to model submarines varying in length from 4ft to 7 ft. (or some other reasonable length/size/shape) based on 4 ft. and 7 ft. prototypes, where the size and number of individual bilge pumps may vary to meet different requirements imposed by different restraints according to hull size and internal dimensions. As an example a large submarine may require two bilge pumps for a down direction whereas a smaller hull may suffice with only one. Size and/or length of a model submarine would be reasonably limited by the size of available bilge pumps. A submarine that is too small or of limited internal space would be limited by the size of the smallest bilge pump currently available which provides functionality as described in accordance with claim 1. Likewise, too large a submarine would be limited by the largest bilge pump available and able to provide functionality as described consonant with claim 1.

Abstract of the Disclosure

[0011] A control/propulsion system for a model submarine 4 -- 7 ft. in length, (can vary within reasonable limits) using bilge pumps, RC components, and exacting ballast to make the submarine completely functional without any external moving parts such as propeller, rudder, and dive planes. Unlike most model submarine's which use external moving parts for directional control such as propeller, dive planes and rudder, the proposed control/ propulsion system accomplishes complete directional control without the use of any external moving parts. This is accomplished with bilge pumps providing water jet thrust through fixed nozzles for all directions, forward, reverse, left, right and down. Since the submarine is positively buoyant the cessation of forward thrust allows the submarine to surface. This is an added safety feature in case of loss of radio signal. Additionally the functional components of the proposed control/ propulsion system are extremely simple compared to other typical model submarines. The major components are simply a

battery, to supply power, a watertight chamber, housing the radio and electrical components, bilge pumps, to provide jet water thrust, and fixed directional nozzles and plumbing to provide desired directional control. The simplicity of this system greatly enhances the reliability of the model submarine and provides trouble-free operation for many hours without the concern of losing the submarine.

Description Of The Drawings

Figures 1 through 4 show a view from the top of a fusiform model submarine hall with the various embodiments. Main components shown are bilge pumps and their associated plumbing and fixed nozzles, the battery, and the watertight chamber.

Figure 5 is a depiction of the watertight chamber and the various embodiments contained therein. These components consist of a typical RC radio receiver, solid-state switches plugged into the receiver converting the typical digital pulse into an on-off switch which in turn operates automotive type relays. Power from the battery comes into the watertight chamber and is distributed by the relays and other components to the various bilge pumps for directional control.

Description Of The Preferred Embodiments

Figure 1 - A top View of the model fusiform submarine hull varying in length from 4 ft. to 7 ft. or some other reasonable dimension showing bilge pumps 2 and 4 which are the left and right (port and starboard) directional pumps. 7/8" PVC pipe 6, 8 (can vary in size and material depending on size of the bilge pump) carries water from the bilge pump to the 90 degree brass nozzles 10, 12 exiting the hull at the bow of the ship. Bilge pumps 14, 16 are the forward directional pumps providing jet water through PVC pipes 18, 20. Water exits through straight brass nozzles 22, 24 providing forward thrust.

Figure 2 - A top View of the model fusiform submarine hull varying in length from 4 ft. to 7 ft. or some other reasonable dimension, showing the watertight chamber 26 and the sealed battery 28.

Figure 3 - A top View of the model fusiform submarine hull varying in length from 4 ft. to 7 ft. or some other reasonable dimension showing the down bilge pumps 30, 32 and 7/8" PVC pipe 34, 36 (can vary in size and material depending on size of the bilge pump) carries water from the bilge pump to the 90 degree brass nozzles 38,40 exiting upward.

Figure 4 - A top View of the model fusiform submarine hull varying in length from 4 ft. to 7 ft. or some other reasonable dimension showing the reverse bilge pump 42 and 7/8" PVC pipe exiting water to the front jet brass straight nozzle 46. Can also exit from a nozzle at the bottom.

Figure 5 - A depiction of the watertight chamber, can vary in size and material e.g. PVC pipe, such that it is sufficiently large to contain the required electrical components. The radio receiver 48, the solid-state electrical switch 50 converting pulse signal (proportional) to on-off to operate the automotive type relays 52 with wires exiting the sealed plug 54 to distribute power to the various bilge pumps for directional control.

Description Of The Pictures

Picture 1 -- picture of 4 ft. sub
Picture 2 -- picture of 7 ft. sub
Picture 3 -- picture of typical bilge pump
Picture 4 -- picture showing placement of bilge pumps in model submarine hull.
Picture 5 -- picture showing solid-state switching device
Picture 6 -- picture showing typical automotive type relays

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